CLAIMS

1. A twist drill for forming holes in or through a workpiece, having a longitudinal axis around which the twist drill is rotated and in the direction of which the twist drill is advanced into the workpiece, and two transverse axes disposed perpendicular to each other and to the longitudinal axis, comprising:

a shank, for enabling the twist drill to be mounted to a driving device;

a body emanating from, and coaxial with the shank, the body having a radius;

at least one flute extending helically along the body;

at least one land disposed adjacent to the at least one flute; and

a point structure, formed on an end of the body distal to the shank,

the point structure being generally in the form of a brad point having an extreme tip through which the longitudinal axis of the drill passes,

the point structure further having two spur structures on opposite sides thereof;

a cutting lip on a leading edge of each of the spur structures,

the drill further including planar axial relief surfaces on trailing surfaces of the lands which intersect the cutting lips.

2. The twist drill according to claim 1, wherein the point comprises a first radially outwardly disposed portion of the at least one land angling inwardly and axially toward the shank, to a position between a peripheral portion of the body, and the longitudinal axis and a second, radially inwardly disposed portion of the at least one land, angling inwardly and axially away from the shank and toward the central point structure.

3. The twist drill according to claim 2, wherein the first radially outwardly disposed portion of the at least one land is defined at least in part by a leading edge angle β_1 and a trailing edge angle β_2, wherein $\beta_1 = 15° \pm 10°$ and $\beta_2 = 12° \pm 7°$.

4. The twist drill according to claim 2, wherein the second, radially inwardly disposed portion of the at least one land is defined at least in part by a point angle α_1, and an angle α_2 which represents an axial separation between the central point structure and radially outer portions of the at least one land, wherein α_1 = 80° - 100°, inclusive; and α_2 = 140° - 170°, inclusive.

5. The twist drill according to claim 1, further comprising:

the at least one flute terminating in a cutting lip disposed proximate the point;

the at least one flute having a sectional configuration, in a plane perpendicular to the longitudinal axis, incorporating

a leading edge,

a trailing edge,

a straight surface extending inwardly from the leading edge, at least to a position coplanar with a plane passing perpendicularly through the straight surface to the longitudinal axis,

a first concave curved portion, extending from an inward end of the straight surface,

a second concave curved portion, extending inwardly from the trailing toward an outer edge region of the first concave curved portion, and

a ridge formed by the intersection of the outer edge region of the first concave curved portion and an inner edge region of the second concave curved portion.

6. The twist drill according to claim 5, wherein the ridge is in the form of a pointed spike.

7. The twist drill according to claim 5, wherein the ridge is in the form of a rounded bump.

8. A twist drill for forming holes in or through a workpiece, having a longitudinal axis around which the twist drill is rotated and in the direction of which the twist drill is advanced into the workpiece, and two transverse axes

disposed perpendicular to each other and to the longitudinal axis, the twist drill comprising:

a shank, for enabling the twist drill to be mounted to a driving device;

a body emanating from, and coaxial with the shank, the body having a radius;

at least one flute extending helically along the body;

at least one land disposed adjacent to the at least one flute;

and

a point structure, formed on an end of the body distal to the shank,

the point structure being generally in the form of a brad point having an extreme tip through which the longitudinal axis of the drill passes,

the point structure further having two spur structures on opposite sides thereof;

a cutting lip on a leading edge of each of the spur structures,

the drill further including planar axial relief surfaces on trailing surfaces of the lands which intersect the cutting lips;

the at least one flute including a leading edge,

a flat surface extending parallel to one of the transverse axes inwardly a distance at least equal to a radius of the drill from the leading edge to a position proximate the second of the transverse axes,

at least a first convex curved portion, emanating from an inner end of the flat surface, for prompting rapid breakup of chips formed by the point and guided into the at least one flute by rotation of the drill,

the at least first convex curved portion terminating in a ridge disposed between the longitudinal axis of the drill and a trailing edge of the at least one flute.

9. The twist drill according to claim 8, further comprising:

a second convex curved portion, disposed in the at least one flute, between the ridge and the trailing edge of the at least one flute.

10. The twist drill according to claim 8, wherein the ridge is in the form of a sharp spike extending along the at least one flute.

11. The twist drill according to claim 8, wherein the ridge is in the form of a rounded bump extending along the at least one flute.

12. A method for making a twist drill comprising:

forming a cylindrical blank, having a longitudinal axis and two transverse axes extending perpendicular to one another and to the longitudinal axis;

forming at least one flute in the cylindrical blank, the at least one flute including a ridge disposed therein for prompting breakage of chips formed during use of the drill, the at least one flute extending from a point region of the cylindrical blank to a shank region of the cylindrical blank;

forming at least one land in the cylindrical blank, the at least one land extending along the blank adjacent to the at least one land;

grinding the point region of the cylindrical blank to a contact angle; grinding a brad and spur configuration onto the point region;

forming an axial relief surface on the at least one land, by aligning the blank along a first axis of an three coordinate axis system, inclining the blank a selected angle away from the first axis while maintaining the blank within a plane defined by the first axis and another axis of the three coordinate system, and then inclining the blank a selected angle away from the plane defined by the first axis and another axis of the three coordinate system; and

presenting the blank to a planar grinding surface disposed perpendicular to the first axis of a three coordinate system.

13. The method according to claim 12, wherein the step of grinding the point region of the cylindrical blank to a contact angle, comprises grinding the contact angle α_2 to be 140° - 170°, inclusive.

14. The method according to claim 12, wherein the step of grinding a brad and spur configuration onto the point region comprises grinding the point region such that α_1 = 80° - 100°, inclusive; β_1 = 15° ± 10° and β_2 = 12° ± 7°.

15. The method according to claim 12, wherein the step of forming an axial relief surface on the at least one land comprises the steps of:

aligning the blank along the z axis of an x-y-z coordinate system;

inclining the blank, in the y-z plane, a distance of 60° ± 20° away from the z axis;

inclining the blank, away from the y-z plane, a distance of 20° ± 10°; and

presenting the so inclined blank to a planar grinding surface disposed perpendicular to the z axis.